

**Claims****What is Claimed:**

1. A system for generating and providing fuel cell data to a processing system, said system comprising:

a fuel tank;

a fuel cell coupled to said fuel tank for receiving fuel within said fuel tank;

at least one sensor for sensing fuel cell characteristics and for providing sensor signals indicative of said fuel cell characteristic to a controller; and

said controller coupled to said fuel tank and to said fuel cell for determining fuel cell parameter values in accordance with said sensed fuel cell characteristics;

a processing system comprising a fuel indicator; and

a data bus for providing said fuel cell data from said fuel cell to said processing system, wherein:

said fuel cell data comprises at least one of said determined fuel cell parameters; and

said controller is coupled to said processing system via said data bus.

2. A system in accordance with claim 1, wherein said sensors comprise a temperature sensor for sensing a temperature of at least one of said fuel cell and said fuel tank.

3. A system in accordance with claim 1, wherein said sensors comprise a pressure sensor for sensing a pressure of said fuel tank.

4. A system in accordance with claim 1, wherein said sensors comprise a current sensor for sensing an electrical current provided by said fuel cell to said host processor.

5. A system in accordance with claim 1, wherein said sensors comprise a voltage sensor for sensing a voltage provided by said fuel cell to said host processor.

6. A system in accordance with claim 1, wherein said fuel is a gaseous fuel.
7. A system in accordance with claim 1, wherein said fuel is a liquid fuel.
8. A system in accordance with claim 1, wherein said fuel cell comprises at least one of a phosphoric acid fuel cell, a proton exchange membrane fuel cell, a molten carbonate fuel cell, a solid oxide fuel cell, an alkaline fuel cell, a direct method fuel cell, a regenerative fuel cell, a zinc-air fuel cell, and a protonic ceramic fuel cell.
9. A system in accordance with claim 1, wherein said data is formatted in accordance with at least one of an advanced configuration and power interface (ACPI) specification, an inter-IC (I<sup>2</sup>C) bus specification, a system management bus (SmBus) specification, and a smart battery charger specification.
10. A system in accordance with claim 1, wherein said processing system is a laptop computer.
11. A system in accordance with claim 10, wherein:
  - said laptop computer is operational with a battery pack; and
  - said fuel cell is functionally compatible and physically interchangeable with said battery pack.
12. A system in accordance with claim 1, further comprising:
  - a flow meter coupled between said fuel tank and said fuel cell for measuring fuel consumption and providing a fuel consumption signal indicative of said consumed amount of fuel to said controller.
13. A system in accordance with claim 12, wherein:
  - said controller:
    - determines a remaining amount of fuel in said fuel cell in accordance with said consumed amount of fuel;

determines a remaining amount of fuel cell power in accordance with said remaining amount of fuel;

determines an electrical consumption rate being consumed by said computer operating system in accordance with a sensed electrical current provided by said fuel cell to said processing system; and

transmits values indicative of said remaining amount of power and said electrical consumption rate from said fuel cell to a computer operating system residing in the processing system via said data bus.

14. A system in accordance with claim 11, wherein:

said operating system determines an amount of remaining time for said fuel cell to provide power to an associated computer operating system in accordance with said transmitted values indicative of said remaining amount of power and said electrical consumption rate.

15. A system in accordance with claim 14, wherein said operating system renders said amount of remaining time via said processing system.

16. A system in accordance with claim 1, wherein:

said fuel is a gaseous fuel; and

said smart controller determines a remaining amount of fuel in accordance with a sensed temperature of said fuel tank, a sensed pressure within said fuel tank; and a volume of said fuel tank.

17. A method for providing data from a fuel cell pack to a computer operating system, said method comprising:

determining a remaining amount of fuel in said fuel cell pack;

determining a remaining amount of fuel cell power in accordance with said remaining amount of fuel;

determining an electrical consumption rate being consumed by said computer operating system; and

transmitting values indicative of said remaining amount of power and said electrical consumption rate from said fuel cell pack to said computer operating system.

18. A method in accordance with claim 17, said act of determining a remaining amount of fuel comprising:

measuring fuel consumption within said fuel cell pack;

determining an aggregate amount of consumed fuel in accordance with said measured fuel consumption; and

subtracting said aggregate amount of consumed fuel from a total amount of fuel, wherein said total amount of fuel is an amount of fuel in said fuel tank when said fuel tank is filled to capacity.

19. A method in accordance with claim 17, wherein:

said fuel is a gaseous fuel; and

said act of determining a remaining amount of fuel comprises:

measuring a temperature of a fuel tank of said fuel cell pack;

measuring a pressure within said fuel tank; and

determining said remaining amount of fuel in accordance with said measured temperature, said measured pressure, and a volume of said fuel tank.

20. A method in accordance with claim 17, further comprising:

determining an amount of remaining time for said fuel cell pack to provide power to said computer operating system in accordance with said transmitted values indicative of said remaining amount of power and said electrical consumption rate.

21. A method in accordance with claim 20, further comprising:

rendering said amount of remaining time.

22. A method in accordance with claim 20, wherein said amount of remaining time is at least one of audibly rendered, mechanically rendered, and visually rendered.

23. A computer-readable medium encoded with computer program code for directing a computer processor to provide data from a fuel cell pack to a computer operator system, said program code comprising:

- a determine remaining fuel code segment for causing said computer processor to determine a remaining amount of fuel in said fuel cell pack;

- a determine remaining fuel cell power code segment for causing said computer processor to determine a remaining amount of fuel cell power in accordance with said remaining amount of fuel;

- a measure current code segment for causing said computer processor to measure an electrical consumption rate being consumed by said computer operating system; and

- a transmit code segment for causing said computer processor to transmit values indicative of said remaining amount of power and said electrical consumption rate from said fuel cell pack to said computer operating system.

24. A computer-readable medium in accordance with claim 23, wherein said determine remaining fuel code segment comprises:

- a measure fuel consumption code segment for causing said computer processor to measure fuel consumption within said fuel cell pack;

- a determine aggregate code segment for causing said computer processor to determine an aggregate amount of consumed fuel in accordance with said measured fuel consumption; and

- a subtract code segment for causing said computer processor to subtract said aggregate amount of consumed fuel from a total amount of fuel, wherein said total

amount of fuel is an amount of fuel in said fuel tank when said fuel tank is filled to capacity.

25. A computer-readable medium in accordance with claim 23, wherein:

said fuel is a gaseous fuel; and

said determine remaining fuel code segment comprises:

a measure temperature code segment for causing said computer processor to measure a temperature of a fuel tank of said fuel cell pack; and

a measure pressure code segment for causing said computer processor to measure a pressure within said fuel tank, wherein:

said remaining amount of fuel is determined in accordance with said measured temperature, said measured pressure, and a volume of said fuel tank.

26. A computer-readable medium in accordance with claim 23, said program code further comprising:

a determine remaining time code segment for causing said computer processor to determine an amount of remaining time for said fuel cell pack to provide power to said computer operating system in accordance with said transmitted values indicative of said remaining amount of power and said electrical consumption rate.

27. A computer-readable medium in accordance with claim 26, further comprising:

a render code segment for causing said computer processor to render said amount of remaining time.

28. A computer-readable medium in accordance with claim 26, wherein said amount of remaining time is at least one of audibly rendered, mechanically rendered, and visually rendered.